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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup>:</b> <b>C11D 3/00, 17/06, 3/20, 3/10, 1/12, 1/66, 1/72, 1/825</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 98/46715</b> <b>(43) International Publication Date:</b> 22 October 1998 (22.10.98)
<b>(21) International Application Number:</b> PCT/IB98/00560 <b>(22) International Filing Date:</b> 14 April 1998 (14.04.98) <b>(30) Priority Data:</b> 97870048.2 14 April 1997 (14.04.97) EP <i>(34) Countries for which the regional or international application was filed:</i> BE et al. 9804461.3 3 March 1998 (03.03.98) GB <b>(71) Applicant (for all designated States except US):</b> THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> BROOKER, Alan, Thomas [GB/GB]; 41 Polwarth Drive, Gosforth, Newcastle-upon-Tyne NE3 5NE (GB). HEINZMAN, Stephen, Wayne [US/GB]; Deleval Old Vicarage, Seaton Sluice, Whitley Bay, Tyne & Wear NE26 4QW (GB). INGRAM, Barry, Thomas [GB/GB]; 47 Western Way, Whitley Bay, Tyne & Wear NE26 1JE (GB). <b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).	<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
<b>(54) Title:</b> FOAMING COMPONENT		
<b>(57) Abstract</b>  The invention provides a substantially anhydrous foaming component, capable of providing foaming or sudsing without agitation, comprising intimately mixed, an effervescence component capable of producing a gas upon contact with water, and a substantially anhydrous surface active component, capable of reducing the surface tension. The compositions are in particular useful in solid cleaning compositions, solid pharmaceutical compositions and solid food and beverage products.		

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### **Foaming component**

### **Technical Field**

This invention relates to a foaming composition useful in any application where foam is required, such as cleaning compositions, pharmaceutical compositions, food and beverages.

### **Background to the Invention**

Foam formation or sudsing is desired in various applications for different reasons. In detergents, specific surfactants are known to provide sudsing in the washing water.

It can be desirable that the foaming or sudsing occurs readily and that the foaming or sudsing has the desired duration. For example, it can be desirable that the effervescence, suds or foam occurs immediately upon contact with water, and that it is stable or continues during use.

Furthermore, to maximise the foaming, sudsing or effervescence capacity of these techniques in use upon contact with water, such contact with water or moisture should be avoided during manufacturing or storage.

Components which react together upon contact with water to produce effervescence are known detergent ingredients. For example, WO 92/18596 discloses detergents comprising admixed citric acid and sodium carbonate salt as an aid to improve the detergent solubility. Effervescence systems are also widely known in pharmaceutical or agricultural applications, for example as described in GB-A-2,184,946.

The inventors have now found that an effervescence component capable of providing a gas, can be used to produce foaming or sudsing, when used in a specific combination with a surface active component capable of reducing the surface tension, so that controlled, rapid, improved sudsing and/ or foaming is achieved. Upon contact with water, the components comprising the specific effervescence component and the specific surface active component, chemically forms microbubbles, preferably having an average diameter of 200 microns or less. The inventors have found that the formation of these microbubbles enables an improved control of the sudsing or foaming or effervescence, and that it results in improved foaming or sudsing stability. e.g. rapidly formed and stable or long-lasting foam or suds can be obtained. Also, it has been found that the components of the invention provide improved effervescence and dispensing and dissolving of the component or the product comprising the component. Furthermore, it has been found that these components are very stable upon storage.

#### Summary of the Invention

The invention provides a substantially anhydrous foaming component capable of providing foaming or sudsing without agitation, comprising intimately mixed, a substantially anhydrous surface active component capable of reducing the air-water surface tension, and an effervescence component capable of formation of a gas upon contact with water.

The component or mixtures of different foaming component according to the invention may be used in any application where a method for providing sudsing, foaming or effervescence is useful. In particular, the composition may be used in, preferably solid, cleaning compositions, pharmaceutical products, cosmetic products and solid food or beverage products and the component may be in useful in applications where no agitation or limited agitation is possible or required, such as hand wash detergent compositions and soaking compositions.

Detailed description of the invention

The foaming component of the invention is capable of providing foaming or sudsing without agitation. It should be understood that for the purpose of the invention, when used herein 'foaming' means any form of formation of gas bubbles, includes sudsing and effervescing. It should be understood that for the purpose of the invention agitation may be desirable.

The foaming component of the invention and the surface active component and preferably the effervescence component are substantially anhydrous.

When used herein, 'substantially anhydrous' means that no more than 5% by weight of free moisture is present, preferably no more than 4%, even more preferably no more than 3% and most preferably no more than 2% or even 1% by weight. The free moisture content as used herein, can be determined by placing 5 grams of the substantially anhydrous component in a petri dish and placing this petri dish in a convection oven at 50°C for 2 hours, and subsequently measuring the weight loss, due to water evaporation.

The effervescence component and the surface active component are intimately mixed. When used herein, 'intimately mixing/ mixed' or 'intimate mixture' means for the purpose of the invention that components of the foaming component are substantially homogeneously divided in the foaming component.

The intimate mixture of the components of the foaming component of the invention can be obtained by any process involving the mixing of the components, which can be part of a tableting process, extrusion process and agglomeration processes. Preferably, the particle is prepared by a process whereby a melt of the surface active component is admixed to the effervescence component, whereafter the mixture is solidified to form the foaming component, preferably by solidifying the melt,

preferably by reducing the process temperature. When the effervescence component comprises more than one component, the components are preferably premixed.

When additional components are to be incorporated in the component, the melt of the surface active component is preferably admixed to the additional ingredients and effervescence component, which are preferably premixed prior to admixed the melt, to obtain an intimate mixture of the components prior to addition of the melt.

Preferably, the foaming component of the invention comprises the effervescence component and the surface active component such that upon contact with water, chemically microbubbles of gas are produced which have an average diameter size of 400 microns or less, preferably 200 microns or less, more preferably 150 microns or less, more preferably 100 microns or less or even 50 microns or less, which can be achieved by intimately mixing the components.

The foaming component or the compositions containing the component can also comprise additional ingredients, as described herein. The precise nature of these additional ingredients, and levels of incorporation thereof will depend on the application of the component or compositions and the physical form of the components and the compositions.

The component preferably comprises the surface active component at a level of from 1% to 95%, more preferably from 10% to 70%, even more preferably from 20% to 60% or even to 50% by weight of the composition. The composition preferably comprises the effervescence component at a level of from 5% to 99%, more preferably from 10% to 90%, even more preferably from 15% to 60% by weight of the composition.

The weight ratio of the surface active component to the effervescence component, or when present, to the acid source therein, is preferably from 20:1 to 1:10, more preferably 9:1 to 1:9, more preferably from 5:1 to 1:8, more preferably from 4:1 to 1:4.



The component, when in the form of a particle or comprised in a particle, is preferably such that 80% by weight of the particles has an particle size of more than 75 microns (more than 80% by weight of the particles on Tyler sieve mesh 200) and less than 10% by weight of the particles has a particle size of more than 2 cm; preferably 80% by weight of the particles has an particle size of more than 150 microns (80% by weight on Tyler sieve mesh 100) and less than 10% by weight of the particles has a particle size of more than 1 cm; or more preferably 80% by weight of the particles has an particle size of more than 300 microns (80% by weight on Tyler sieve mesh 48) and less than 10% by weight of the particles has a particle size of more than 0.5 cm; or even more preferably the particles have an average particle size of from 500 microns (on Tyler sieve mesh 32) to 3000 microns, more preferably from 710 microns (on Tyler mesh sieve 24) to 1180 microns (through Tyler mesh sieve 14).

Preferably, the density of the component is from 500 g/litre to 1200 g/litre, more preferably from 650 g/litre to 900g/litre.

The component of the invention is particularly useful in nonaqueous liquid compositions or solid compositions, preferably cleaning products or food or beverage products. The component may be present as a separate particle or the it can be present as a part of a component of the solid or nonaqueous liquid composition. The solid cleaning compositions are preferably solid laundry or dish washing compositions, preferably in the form of flakes or pastilles, more preferably in the form of granules or extrudates or tablets, preferably having a density of at least 500g/litre, more preferably at least 700g/litre.

#### Effervescence component

Any effervescence system capable of forming a gas upon contact with water, known in the art, can be used as effervescence component in the foaming component of the

invention. A preferred effervescence component comprises an acid source, capable of reacting with an alkali source in the presence of water to produce a gas.

The alkali source or part thereof is preferably a components of the effervescence component, when an acid source is present.

The acid source may be any organic, mineral or inorganic acid, or a derivative thereof, or a mixture thereof. Preferably the acid source comprises an organic acid.

The acid source is preferably substantially anhydrous or non-hygroscopic and the acid is preferably water-soluble. It may be preferred that the acid source is overdried.

Suitable acids source components include citric, malic, maleic, fumaric aspartic, glutaric, tartaric succinic or adipic acid, monosodium phosphate, boric acid, or derivative thereof. Citric acid, maleic or malic acid are especially preferred.

Most preferably, the acid source provides acidic compounds which have an average particle size in the range of from about 75 microns to 1180 microns, more preferably from 150 microns to about 710 microns, calculated by sieving a sample of the source of acidity on a series of Tyler sieves.

The effervescence component preferably comprises an alkali source. Any alkali source which has the capacity to react with the acid source to produce a gas may be present in the particle, including sources capable of producing nitrogen, oxygen or carbondioxide gas. Preferred can be perhydrate bleaches and silicate material. The alkali source is preferably substantially anhydrous or non-hydroscopic. It may be preferred that the alkali source is overdried.

Preferably the produced gas is carbon dioxide, and therefore the alkali source is a preferably a source of carbonate; in a preferred embodiment, the alkali source is a carbonate salt. Examples of preferred carbonates are the alkaline earth and alkali

metal carbonates, including sodium or potassium carbonate, bicarbonate and sesquicarbonate and any mixtures thereof with ultra-fine calcium carbonate such as are disclosed in German Patent Application No. 2,321,001 published on November 15, 1973. Alkali metal percarbonate salts are also suitable sources of carbonate species, which may be present combined with one or more other carbonate sources.

The carbonate and bicarbonate preferably have an amorphous structure. The carbonate and/ or bicarbonates may be coated with coating materials. The particles of carbonate and bicarbonate can have a mean particle size of 75 microns or greater, preferably 150 $\mu$ m or greater, more preferably of 250 $\mu$ m or greater, preferably 500 $\mu$ m or greater. It may be preferred that the carbonate salt is such that fewer than 20% (by weight) of the particles have a particle size below 500 $\mu$ m, calculated by sieving a sample of the carbonate or bicarbonate on a series of Tyler sieves. Alternatively or in addition to the previous carbonate salt, it may be preferred that the fewer than 60% or even 25% of the particles have a particle size below 150 $\mu$ m, whilst fewer than 5% has a particle size of more than 1.18 mm, more preferably fewer than 20% have a particle size of more than 212  $\mu$ m, calculated by sieving a sample of the carbonate or bicarbonate on a series of Tyler sieves.

The molecular ratio of the acid source to the alkali source present in the particle core is preferably from 60:1 to 1:60, more preferably from 20:1 to 1:20, more preferably from 10:1 to 1:10, more preferably from 5:1 to 1:3, more preferably from 3:1 to 1:2, more preferably from 2:1 to 1:2.

#### Surface active component

The foaming component of the invention may comprise any surface active component known in the art, which reduces the water-air surface tension. Which surface active component is preferably incorporated in the composition of the invention, will depend on the application of the component of the invention, and the physical form thereof.

The surface active component can comprise one or more compounds. Preferably, the component comprises compounds which are, at least partially, water-soluble. Preferably, the component is anhydrous.

The surface active component preferably has a melting point above 30°C, more preferably above 45°C, more preferably above 50°C, and it may be preferred that the surface active component has a melting point above 80°C, in particular to ensure that the surface active component is solid under normal storage conditions, whilst readily forming a melt above the preferred melting point, depending on the application of the composition of the invention.

It may be preferred that the surface active component comprises one or more nonionic components or one or more anionic components or mixtures thereof.

In particular when the component of the invention is for use in cleaning compositions, the surface active component preferably comprises one or more components, selected from the group comprising alkyl sulfate surfactants and alkyl sulphonate surfactants, as described herein and in particular alkoxyated alcohols, including polyethylene and/or propylene glycols, alkoxyated fatty acid amides and alkoxyated alcoholamides, including ethanolamides and specific nonionic surfactants, including (polyhydroxy) fatty acid amides, alkoxyated alcohol surfactants, alkyl esters of fatty acids and specific alkylpolysaccherides surfactant or mixtures of any of these nonionics compounds and anionic compounds, as described herein.

Thus, preferably, one or more of the components comprised in the foaming component are detergent actives which can contribute to the cleaning performance of the particle or the cleaning composition comprising the particle. Highly preferred substantially anhydrous surface active components suitable in the foaming component of the invention, are one or more nonionic surfactant, selected from the group of nonionic alkoxyated surfactants, including alkoxyated alcohol surfactants,

polyhydroxyfattyacid amide surfactants, (alkoxylated) fatty acid amide surfactants and alkylpolysaccharide surfactants, or mixtures thereof, as described herein after.

In a highly preferred aspect of the invention, the surface active component comprises a mixture of polyhydroxy fatty acid amides and/ or polyethylene glycols, and/ or alkoxylated fatty acid amides and/ or condensation products of aliphatic alcohols with from 1 to 11 moles of alkylene oxide, as described in more detail below. When present, the ratio of the polyhydroxy fatty acid amides to the condensation products of aliphatic alcohols is preferably from 20:1 to 1:20, more preferably from 10:1 to 1:10, more preferably from 8:1 to 1:8, more preferably from 6:1 to 1:6, most preferably from 2:1 to 1:3. When present, the ratio of the polyhydroxy fatty acid amides to the polyethylene glycol is preferably from 20:1 to 1:8, more preferably from 15:1 to 1:3, more preferably from 12:1 to 1:1, more preferably from 10:1 to 1:1. When present, the ratio of the polyhydroxy fatty acid amides to the alkoxylated fatty acid amides is preferably from 20:1 to 1:20, more preferably from 15:1 to 1:10, more preferably from 10:1 to 1:10.

#### Nonionic alkoxylated surfactant

Essentially any alkoxylated nonionic surfactants can also be comprised in the surface active component of the foaming component of the invention. The ethoxylated and propoxylated nonionic surfactants are preferred. Preferred alkoxylated surfactants can be selected from the classes of the nonionic condensates of alkyl phenols, nonionic ethoxylated alcohols, nonionic ethoxylated/propoxylated fatty alcohols, nonionic ethoxylate/propoxylate condensates with propylene glycol, and the nonionic ethoxylate condensation products with propylene oxide/ethylene diamine adducts.

Highly preferred are nonionic alkoxylated alcohol surfactants, being the condensation products of aliphatic alcohols with from 1 to 75, up to 50 moles, preferably 1 to 15 moles of alkylene oxide, particularly ethylene oxide and/or propylene oxide, are highly preferred nonionic surfactant comprised in the anhydrous component of the

particles of the invention. The alkyl chain of the aliphatic alcohol can either be straight or branched, primary or secondary, and generally contains from 6 to 22 carbon atoms. Particularly preferred are the condensation products of alcohols having an alkyl group containing from 8 to 20 carbon atoms with from 2 to 9 moles and in particular 3 or 5 moles, of ethylene oxide per mole of alcohol.

Nonionic polyhydroxy fatty acid amide surfactant

Polyhydroxy fatty acid amides are highly preferred nonionic surfactant comprised in the surface active component of the foaming component of the invention, in particular those having the structural formula  $R^2CONR^1Z$  wherein:  $R^1$  is H,  $C_1$ -18, preferably  $C_1$ - $C_4$  hydrocarbyl, 2-hydroxy ethyl, 2-hydroxy propyl, ethoxy, propoxy, or a mixture thereof, preferable  $C_1$ - $C_4$  alkyl, more preferably  $C_1$  or  $C_2$  alkyl, most preferably  $C_1$  alkyl (i.e., methyl); and  $R^2$  is a  $C_5$ - $C_{31}$  hydrocarbyl, preferably straight-chain  $C_5$ - $C_{19}$  or  $C_7$ - $C_{19}$  alkyl or alkenyl, more preferably straight-chain  $C_9$ - $C_{17}$  alkyl or alkenyl, most preferably straight-chain  $C_{11}$ - $C_{17}$  alkyl or alkenyl, or mixture thereof; and Z is a polyhydroxyhydrocarbyl having a linear hydrocarbyl chain with at least 3 hydroxyls directly connected to the chain, or an alkoxyated derivative (preferably ethoxyated or propoxyated) thereof. Z preferably will be derived from a reducing sugar in a reductive amination reaction; more preferably Z is a glycityl.

A highly preferred nonionic polyhydroxy fatty acid amide surfactant for use herein is a  $C_{12}$ - $C_{14}$ , a  $C_{15}$ - $C_{17}$  and/or  $C_{16}$ - $C_{18}$  alkyl N-methyl glucamide.

It may be particularly preferred that the surface active component comprises a mixture of a  $C_{12}$ - $C_{18}$  alkyl N-methyl glucamide and a condensation products of a alcohol having an alkyl group containing from 8 to 20 carbon atoms with from 2 to 9 moles and in particular 3 or 5 moles, of ethylene oxide per mole of alcohol.

The polyhydroxy fatty acid amide can be prepared by any suitable process. One particularly preferred process is described in detail in WO 9206984. A product

comprising about 95% by weight polyhydroxy fatty acid amide, low levels of undesired impurities such as fatty acid esters and cyclic amides, and which is molten typically above about 80°C, can be made by this process

#### Nonionic fatty acid amide surfactant

Fatty acid amide surfactants or alkoxylated fatty acid amides can also be comprised in the anhydrous material of the particle of the invention. They include those having the formula:  $R^6\text{CON}(R^7)(R^8)$  wherein  $R^6$  is an alkyl group containing from 7 to 21, preferably from 9 to 17 carbon or even 12 to 14 carbon atoms and  $R^7$  and  $R^8$  are each individually selected from the group consisting of hydrogen,  $C_1$ - $C_4$  alkyl,  $C_1$ - $C_4$  hydroxyalkyl, and  $-(C_2H_4O)_xH$ , where x is in the range of from 1 to 11, preferably 1 to 7, more preferably from 1-5, whereby it may be preferred that  $R^7$  is different to  $R^8$ , one having a smaller alkoxylation number than the other.

#### Nonionic alkyl esters of fatty acid surfactant

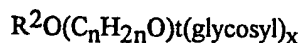
Alkyl esters of fatty acids can also be comprised in the anhydrous material of the particle of the invention. They include those having the formula:  $R^9\text{COO}(R^{10})$  wherein  $R^9$  is an alkyl group containing from 7 to 21, preferably from 9 to 17 carbon or even 11 to 13 carbon atoms and  $R^{10}$  is a  $C_1$ - $C_4$  alkyl,  $C_1$ - $C_4$  hydroxyalkyl, or  $-(C_2H_4O)_xH$ , where x is in the range of from 1 to 11, preferably 1 to 7, more preferably from 1-5, whereby it may be preferred that  $R^{10}$  is a methyl or ethyl group.

#### Nonionic alkylpolysaccharide surfactant

Alkylpolysaccharides can also be comprised in the surface active component of the foaming component of the invention, such as those disclosed in U.S. Patent 4,565,647, Llenado; issued January 21, 1986, having a hydrophobic group containing

from 6 to 30 carbon atoms and a polysaccharide, e.g., a polyglycoside, hydrophilic group containing from 1.3 to 10 saccharide units.

Preferred alkylpolyglycosides have the formula



wherein  $R^2$  is selected from the group consisting of alkyl, alkylphenyl, hydroxyalkyl, hydroxyalkylphenyl, and mixtures thereof in which the alkyl groups contain from 10 to 18 carbon atoms;  $n$  is 2 or 3;  $t$  is from 0 to 10, and  $x$  is from 1.3 to 8. The glycosyl is preferably derived from glucose.

#### Polyethylene/ propylene glycols

A component of the surface active component may be a polyethylene and/or propylene glycol, particularly those of molecular weight 1000-10000, more particularly 2000 to 8000 and most preferably about 4000.

#### Anionic surfactant

The surface active component of the composition of the invention may comprises one or more anionic surfactants. Any anionic surfactant useful for deterative purposes is suitable. Examples include salts (including, for example, sodium, potassium, ammonium, and substituted ammonium salts such as mono-, di- and triethanolamine salts) of the anionic sulfate, sulfonate, carboxylate and sarcosinate surfactants. Anionic sulfate surfactants are preferred.

Other anionic surfactants include the isethionates such as the acyl isethionates, N-acyl taurates, fatty acid amides of methyl tauride, alkyl succinates and sulfosuccinates, monoesters of sulfosuccinate (especially saturated and unsaturated  $C_{12}$ - $C_{18}$



monoesters) diesters of sulfosuccinate (especially saturated and unsaturated  $C_6-C_{14}$  diesters), N-acyl sarcosinates. Resin acids and hydrogenated resin acids are also suitable, such as rosin, hydrogenated rosin, and resin acids and hydrogenated resin acids present in or derived from tallow oil.

The anionic surfactant may preferably be present at a level of 1% to 90% by weight of the foaming component, preferably at a level of from 5% to 60%, and preferably of from 8% to 50% by weight of the component.

#### Anionic sulfate surfactant

Anionic sulfate surfactants suitable for use herein include the linear and branched primary and secondary alkyl sulfates, alkyl ethoxysulfates, fatty oleoyl glycerol sulfates, alkyl phenol ethylene oxide ether sulfates, the  $C_5-C_{17}$  acyl-N-( $C_1-C_4$  alkyl) and -N-( $C_1-C_2$  hydroxyalkyl) glucamine sulfates, and sulfates of alkylpolysaccharides such as the sulfates of alkylpolyglucoside (the nonionic nonsulfated compounds being described herein).

Alkyl sulfate surfactants are preferably selected from the linear and branched primary  $C_9-C_{22}$  alkyl sulfates, more preferably the  $C_{11}-C_{15}$  branched chain alkyl sulfates and the  $C_{12}-C_{14}$  linear chain alkyl sulfates.

Alkyl ethoxysulfate surfactants are preferably selected from the group consisting of the  $C_{10}-C_{18}$  alkyl sulfates which have been ethoxylated with from 0.5 to 50 moles of ethylene oxide per molecule. More preferably, the alkyl ethoxysulfate surfactant is a  $C_{11}-C_{18}$ , most preferably  $C_{11}-C_{15}$  alkyl sulfate which has been ethoxylated with from 0.5 to 7, preferably from 1 to 5, moles of ethylene oxide per molecule.

#### Anionic sulfonate surfactant

Anionic sulfonate surfactants suitable for use herein include the salts of C<sub>5</sub>-C<sub>20</sub> linear or branched alkylbenzene sulfonates, alkyl ester sulfonates, in particular methyl ester sulphonates, C<sub>6</sub>-C<sub>22</sub> primary or secondary alkane sulfonates, C<sub>6</sub>-C<sub>24</sub> olefin sulfonates, sulfonated polycarboxylic acids, alkyl glycerol sulfonates, fatty acyl glycerol sulfonates, fatty oleyl glycerol sulfonates, and any mixtures thereof.

#### Anionic carboxylate surfactant

Suitable anionic carboxylate surfactants include the alkyl ethoxy carboxylates, the alkyl polyethoxy polycarboxylate surfactants and the soaps ('alkyl carboxyls'), especially certain secondary soaps as described herein.

Suitable alkyl ethoxy carboxylates include those with the formula  $RO(CH_2CH_2O)_xCH_2COO^-M^+$  wherein R is a C<sub>6</sub> to C<sub>18</sub> alkyl group, x ranges from 0 to 10, and the ethoxylate distribution is such that, on a weight basis, the amount of material where x is 0 is less than 20 % and M is a cation. Suitable alkyl polyethoxy polycarboxylate surfactants include those having the formula  $RO-(CHR_1-CHR_2-O)_x-R_3$  wherein R is a C<sub>6</sub> to C<sub>18</sub> alkyl group, x is from 1 to 25, R<sub>1</sub> and R<sub>2</sub> are selected from the group consisting of hydrogen, methyl acid radical, succinic acid radical, hydroxysuccinic acid radical, and mixtures thereof, and R<sub>3</sub> is selected from the group consisting of hydrogen, substituted or unsubstituted hydrocarbon having between 1 and 8 carbon atoms, and mixtures thereof.

Suitable soap surfactants include the secondary soap surfactants which contain a carboxyl unit connected to a secondary carbon. Preferred secondary soap surfactants for use herein are water-soluble members selected from the group consisting of the water-soluble salts of 2-methyl-1-undecanoic acid, 2-ethyl-1-decanoic acid, 2-propyl-1-nonanoic acid, 2-butyl-1-octanoic acid and 2-pentyl-1-heptanoic acid. Certain soaps may also be included as suds suppressors.

#### Alkali metal sarcosinate surfactant

Other suitable anionic surfactants are the alkali metal sarcosinates of formula  $R-CON(R^1)CH_2COOM$ , wherein  $R$  is a  $C_5-C_{17}$  linear or branched alkyl or alkenyl group,  $R^1$  is a  $C_1-C_4$  alkyl group and  $M$  is an alkali metal ion. Preferred examples are the myristyl and oleoyl methyl sarcosinates in the form of their sodium salts.

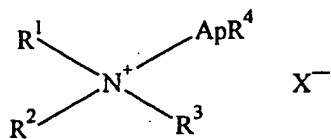
#### Cationic surfactant

A cationic surfactant may be comprised in the surface active component of the composition of the invention, preferably be present at a level of from 0.5% to 80% by weight of the component, more preferably from 1% to 60%, most preferably from 3% to 50% by weight of the component.

Preferably the cationic surfactant is selected from the group consisting of cationic ester surfactants, cationic mono-alkoxylated amine surfactants, cationic bis-alkoxylated amine surfactants and mixtures thereof.

#### Cationic mono-alkoxylated amine surfactants

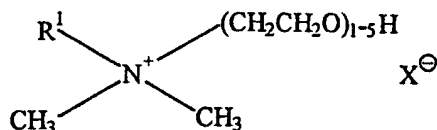
The optional cationic mono-alkoxylated amine surfactant for use herein, has the general formula:



wherein  $R^1$  is an alkyl or alkenyl moiety containing from about 6 to about 18 carbon atoms, preferably 6 to about 16 carbon atoms, most preferably from about 6 to about 11 carbon atoms;  $R^2$  and  $R^3$  are each independently alkyl groups containing from one to about three carbon atoms, preferably methyl;  $R^4$  is selected from hydrogen (preferred), methyl and ethyl,  $X^-$  is an anion such as chloride, bromide, methylsulfate,

sulfate, or the like, to provide electrical neutrality; A is selected from C<sub>1</sub>-C<sub>4</sub> alkoxy, especially ethoxy (i.e., -CH<sub>2</sub>CH<sub>2</sub>O-), propoxy, butoxy and mixtures thereof; and p is from 1 to about 30, preferably 1 to about 15, most preferably 1 to about 8.

Highly preferred cationic mono-alkoxylated amine surfactants for use herein are of the formula

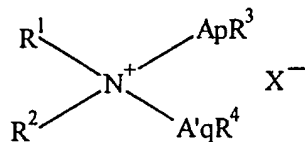


wherein R<sup>1</sup> is C<sub>6</sub>-C<sub>18</sub> hydrocarbyl and mixtures thereof, preferably C<sub>6</sub>-C<sub>14</sub>, especially C<sub>6</sub>-C<sub>11</sub> alkyl, preferably C<sub>8</sub> and C<sub>10</sub> alkyl, and X is any convenient anion to provide charge balance, preferably chloride or bromide.

As noted, compounds of the foregoing type include those wherein the ethoxy (CH<sub>2</sub>CH<sub>2</sub>O) units (EO) are replaced by butoxy, isopropoxy [CH(CH<sub>3</sub>)CH<sub>2</sub>O] and [CH<sub>2</sub>CH(CH<sub>3</sub>)O] units (i-Pr) or n-propoxy units (Pr), or mixtures of EO and/or Pr and/or i-Pr units.

#### Cationic bis-alkoxylated amine surfactant

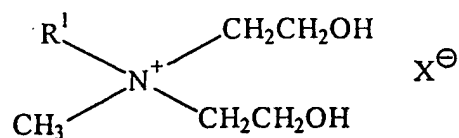
The cationic bis-alkoxylated amine surfactant for use herein, has the general formula:



wherein R<sup>1</sup> is an alkyl or alkenyl moiety containing from about 6 to about 18 carbon atoms, preferably 6 to about 16 carbon atoms, more preferably 6 to about 11, most preferably from about 8 to about 10 carbon atoms; R<sup>2</sup> is an alkyl group containing

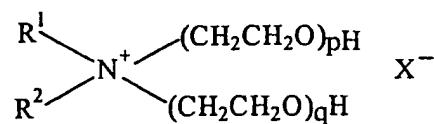
from one to three carbon atoms, preferably methyl;  $R^3$  and  $R^4$  can vary independently and are selected from hydrogen (preferred), methyl and ethyl,  $X^-$  is an anion such as chloride, bromide, methylsulfate, sulfate, or the like, sufficient to provide electrical neutrality. A and A' can vary independently and are each selected from  $C_1$ - $C_4$  alkoxy, especially ethoxy, (i.e.,  $-\text{CH}_2\text{CH}_2\text{O}-$ ), propoxy, butoxy and mixtures thereof; p is from 1 to about 30, preferably 1 to about 4 and q is from 1 to about 30, preferably 1 to about 4, and most preferably both p and q are 1.

Highly preferred cationic bis-alkoxylated amine surfactants for use herein are of the formula



wherein  $R^1$  is  $C_6$ - $C_{18}$  hydrocarbyl and mixtures thereof, preferably  $C_6$ ,  $C_8$ ,  $C_{10}$ ,  $C_{12}$ ,  $C_{14}$  alkyl and mixtures thereof. X is any convenient anion to provide charge balance, preferably chloride. With reference to the general cationic bis-alkoxylated amine structure noted above, since in a preferred compound  $R^1$  is derived from (coconut)  $C_{12}$ - $C_{14}$  alkyl fraction fatty acids,  $R^2$  is methyl and  $A^pR^3$  and  $A'^qR^4$  are each monoethoxy.

Other cationic bis-alkoxylated amine surfactants useful herein include compounds of the formula:



wherein  $R^1$  is  $C_6$ - $C_{18}$  hydrocarbyl, preferably  $C_6$ - $C_{14}$  alkyl, independently  $p$  is 1 to about 3 and  $q$  is 1 to about 3,  $R^2$  is  $C_1$ - $C_3$  alkyl, preferably methyl, and  $X$  is an anion, especially chloride or bromide.

Other compounds of the foregoing type include those wherein the ethoxy ( $CH_2CH_2O$ ) units (EO) are replaced by butoxy (Bu) isopropoxy [ $CH(CH_3)CH_2O$ ] and [ $CH_2CH(CH_3)O$ ] units (i-Pr) or n-propoxy units (Pr), or mixtures of EO and/or Pr and/or i-Pr units.

#### Amphoteric surfactant

Suitable amphoteric surfactants for use herein include the amine oxide surfactants and the alkyl amphocarboxylic acids.

Suitable amine oxides include those compounds having the formula  $R^3(OR^4)_xN^0(R^5)_2$  wherein  $R^3$  is selected from an alkyl, hydroxyalkyl, acylamidopropoyl and alkyl phenyl group, or mixtures thereof, containing from 8 to 26 carbon atoms;  $R^4$  is an alkylene or hydroxyalkylene group containing from 2 to 3 carbon atoms, or mixtures thereof;  $x$  is from 0 to 5, preferably from 0 to 3; and each  $R^5$  is an alkyl or hydroxyalkyl group containing from 1 to 3, or a polyethylene oxide group containing from 1 to 3 ethylene oxide groups. Preferred are  $C_{10}$ - $C_{18}$  alkyl dimethylamine oxide, and  $C_{10}$ -18 acylamido alkyl dimethylamine oxide.

A suitable example of an alkyl aphodicarboxylic acid is Miranol(TM) C2M Conc. manufactured by Miranol, Inc., Dayton, NJ.

#### Zwitterionic surfactant

Zwitterionic surfactants can also be comprised in the surface active component of the composition of the invention or the compositions containing the particle of the

invention. These surfactants can be broadly described as derivatives of secondary and tertiary amines, derivatives of heterocyclic secondary and tertiary amines, or derivatives of quaternary ammonium, quaternary phosphonium or tertiary sulfonium compounds. Betaine and sultaine surfactants are exemplary zwitterionic surfactants for use herein.

Suitable betaines are those compounds having the formula  $R(R')_2N^+R^2COO^-$  wherein R is a  $C_6$ - $C_{18}$  hydrocarbyl group, each  $R^1$  is typically  $C_1$ - $C_3$  alkyl, and  $R^2$  is a  $C_1$ - $C_5$  hydrocarbyl group. Preferred betaines are  $C_{12}$ - $C_{18}$  dimethyl-ammonio hexanoate and the  $C_{10}$ - $C_{18}$  acylamidopropane (or ethane) dimethyl (or diethyl) betaines. Complex betaine surfactants are also suitable for use herein.

#### Cleaning compositions

The foaming component of the invention can be incorporated in a cleaning composition, preferably a solid composition, preferably granular, preferably laundry or dish washing compositions. The composition of the invention is then preferably in the form of a particle or comprised in a particle.

Then, the components of the invention for use in cleaning compositions, and/ or the cleaning compositions preferably contain one or more additional detergent components selected from additional surfactants, bleaches, builders, chelants, (additional) alkalinity sources, organic polymeric compounds, enzymes, suds suppressors, lime soap dispersants, brighteners, soil suspension and anti-redeposition agents and corrosion inhibitors.

Highly preferred additional deterative actives or ingredients are cationic and anionic surfactants, as described above, suds suppressing systems, brighteners, and bleaching compounds, including perhydrate bleaches but preferably bleach activators, as described hereinafter.

Suds suppressing system

The foaming component of the invention provide a very rapid formation of very stable foam.

However, it may be preferred that the foaming is limited or reduced at a certain moment during the washing process, for example to improve the drainage of the suds or foam from the washing process or the machine. Also, it may be preferred that the foaming is limited to the start of the contact with water (e.g. the beginning of the washing process), to provide effervescence, or improved dispensing or dissolving of the component or the product comprising the component. Therefore, it may be preferably comprise a suds suppressing system present at a level of from 0.01% to 15%, preferably from 0.05% to 10%, most preferably from 0.1% to 5% by weight of the composition or the component.

Suitable suds suppressing systems for use herein may comprise essentially any known antifoam compound, including, for example silicone antifoam compounds and 2-alkyl alcanol antifoam compounds.

By antifoam compound it is meant herein any compound or mixtures of compounds which act such as to depress the foaming or sudsing produced by a solution of a detergent composition.

Particularly preferred antifoam compounds for use herein are silicone antifoam compounds defined herein as any antifoam compound including a silicone component. Such silicone antifoam compounds also typically contain a silica component. The term "silicone" as used herein, and in general throughout the industry, encompasses a variety of relatively high molecular weight polymers containing siloxane units and hydrocarbyl group of various types. Preferred silicone antifoam compounds are the siloxanes, particularly the polydimethylsiloxanes having trimethylsilyl end blocking units.



Other suitable antifoam compounds include the monocarboxylic fatty acids and soluble salts thereof. These materials are described in US Patent 2,954,347, issued September 27, 1960 to Wayne St. John. The monocarboxylic fatty acids, and salts thereof, for use as suds suppressor typically have hydrocarbyl chains of 10 to 24 carbon atoms, preferably 12 to 18 carbon atoms. Suitable salts include the alkali metal salts such as sodium, potassium, and lithium salts, and ammonium and alkanolammonium salts.

Other suitable antifoam compounds include, for example, high molecular weight fatty esters (e.g. fatty acid triglycerides), fatty acid esters of monovalent alcohols, aliphatic C<sub>18</sub>-C<sub>40</sub> ketones (e.g. stearone) N-alkylated amino triazines such as tri- to hexa-alkylmelamines or di- to tetra alkyl diamine chlortriazines formed as products of cyanuric chloride with two or three moles of a primary or secondary amine containing 1 to 24 carbon atoms, propylene oxide, bis stearic acid amide and monostearyl di-alkali metal (e.g. sodium, potassium, lithium) phosphates and phosphate esters.

A preferred suds suppressing system comprises

(a) antifoam compound, preferably silicone antifoam compound, most preferably a silicone antifoam compound comprising in combination

(i) polydimethyl siloxane, at a level of from 50% to 99%, preferably 75% to 95% by weight of the silicone antifoam compound; and

(ii) silica, at a level of from 1% to 50%, preferably 5% to 25% by weight of the silicone/silica antifoam compound;

wherein said silica/silicone antifoam compound is incorporated at a level of from 5% to 50%, preferably 10% to 40% by weight;

- (b) a dispersant compound, most preferably comprising a silicone glycol rake copolymer with a polyoxyalkylene content of 72-78% and an ethylene oxide to propylene oxide ratio of from 1:0.9 to 1:1.1, at a level of from 0.5% to 10%, preferably 1% to 10% by weight; a particularly preferred silicone glycol rake copolymer of this type is DCO544, commercially available from DOW Corning under the tradename DCO544;
- (c) an inert carrier fluid compound, most preferably comprising a C<sub>16</sub>-C<sub>18</sub> ethoxylated alcohol with a degree of ethoxylation of from 5 to 50, preferably 8 to 15, at a level of from 5% to 80%, preferably 10% to 70%, by weight;

A highly preferred particulate suds suppressing system is described in EP-A-0210731 and comprises a silicone antifoam compound and an organic carrier material having a melting point in the range 50°C to 85°C, wherein the organic carrier material comprises a monoester of glycerol and a fatty acid having a carbon chain containing from 12 to 20 carbon atoms. EP-A-0210721 discloses other preferred particulate suds suppressing systems wherein the organic carrier material is a fatty acid or alcohol having a carbon chain containing from 12 to 20 carbon atoms, or a mixture thereof, with a melting point of from 45°C to 80°C.

#### Water-soluble builder compound

The foaming component of the invention or the cleaning compositions preferably contain a water-soluble builder compound, typically present at a level of from 1% to 80% by weight, preferably from 10% to 70% by weight, most preferably from 20% to 60% by weight of the composition or component.

Suitable water-soluble builder compounds include the water soluble monomeric polycarboxylates, or their acid forms, homo or copolymeric polycarboxylic acids or their salts in which the polycarboxylic acid comprises at least two carboxylic radicals

separated from each other by not more than two carbon atoms, borates, phosphates, and mixtures of any of the foregoing.

The carboxylate or polycarboxylate builder can be monomeric or oligomeric in type although monomeric polycarboxylates are generally preferred for reasons of cost and performance.

Suitable carboxylates containing one carboxy group include the water soluble salts of lactic acid, glycolic acid and ether derivatives thereof. Polycarboxylates containing two carboxy groups include the water-soluble salts of succinic acid, malonic acid, (ethylenedioxy) diacetic acid, maleic acid, diglycolic acid, tartaric acid, tartronic acid and fumaric acid, as well as the ether carboxylates and the sulfinyl carboxylates. Polycarboxylates containing three carboxy groups include, in particular, water-soluble citrates, aconitrates and citraconates as well as succinate derivatives such as the carboxymethyloxysuccinates described in British Patent No. 1,379,241, lactoxysuccinates described in British Patent No. 1,389,732, and aminosuccinates described in Netherlands Application 7205873, and the oxypolycarboxylate materials such as 2-oxa-1,1,3-propane tricarboxylates described in British Patent No. 1,387,447.

Polycarboxylates containing four carboxy groups include oxydisuccinates disclosed in British Patent No. 1,261,829, 1,1,2,2-ethane tetracarboxylates, 1,1,3,3-propane tetracarboxylates and 1,1,2,3-propane tetracarboxylates. Polycarboxylates containing sulfo substituents include the sulfosuccinate derivatives disclosed in British Patent Nos. 1,398,421 and 1,398,422 and in U.S. Patent No. 3,936,448, and the sulfonated pyrolysed citrates described in British Patent No. 1,439,000. Preferred polycarboxylates are hydroxycarboxylates containing up to three carboxy groups per molecule, more particularly citrates.

Borate builders, as well as builders containing borate-forming materials that can produce borate under detergent storage or wash conditions are useful water-soluble builders herein.

Suitable examples of water-soluble phosphate builders are the alkali metal tripolyphosphates, sodium, potassium and ammonium pyrophosphate, sodium and potassium and ammonium pyrophosphate, sodium and potassium orthophosphate, sodium polymeta/phosphate in which the degree of polymerization ranges from about 6 to 21, and salts of phytic acid.

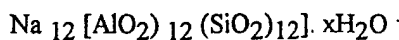
#### Partially soluble or insoluble builder compound

The component of the invention or the compositions containing the component of the invention may contain a partially soluble or insoluble builder compound, typically present at a level of from 1% to 80% by weight, preferably from 10% to 70% by weight, most preferably from 20% to 60% weight of the composition or component

Examples of largely water insoluble builders include the sodium aluminosilicates.

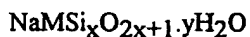
Suitable aluminosilicate zeolites have the unit cell formula  $\text{Na}_x[(\text{AlO}_2)_z(\text{SiO}_2)_y] \cdot x\text{H}_2\text{O}$  wherein z and y are at least 6; the molar ratio of z to y is from 1.0 to 0.5 and x is at least 5, preferably from 7.5 to 276, more preferably from 10 to 264. The aluminosilicate material are in hydrated form and are preferably crystalline, containing from 10% to 28%, more preferably from 18% to 22% water in bound form.

The aluminosilicate zeolites can be naturally occurring materials, but are preferably synthetically derived. Synthetic crystalline aluminosilicate ion exchange materials are available under the designations Zeolite A, Zeolite B, Zeolite P, Zeolite X, Zeolite HS and mixtures thereof. Zeolite A has the formula



wherein x is from 20 to 30, especially 27. Zeolite X has the formula  $\text{Na}_{86}[(\text{AlO}_2)_{86}(\text{SiO}_2)_{106}] \cdot 276 \text{ H}_2\text{O}$ .

Preferred crystalline layered silicates for use herein have the general formula



wherein M is sodium or hydrogen, x is a number from 1.9 to 4 and y is a number from 0 to 20. Crystalline layered sodium silicates of this type are disclosed in EP-A-0164514 and methods for their preparation are disclosed in DE-A-3417649 and DE-A-3742043. Herein, x in the general formula above preferably has a value of 2, 3 or 4 and is preferably 2. The most preferred material is  $\delta\text{-Na}_2\text{Si}_2\text{O}_5$ , available from Hoechst AG as NaSKS-6.

#### Perhydrate bleaches

An preferred additional components of the foaming component of the invention or the cleaning composition is a perhydrate bleach, such as metal perborates, metal percarbonates, particularly the sodium salts. Perborate can be mono or tetra hydrated. Sodium percarbonate has the formula corresponding to  $2\text{Na}_2\text{CO}_3 \cdot 3\text{H}_2\text{O}_2$ , and is available commercially as a crystalline solid.

Potassium peroxymonopersulfate, sodium per is another optional inorganic perhydrate salt of use in the detergent compositions or foaming components.

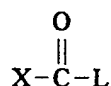
#### Organic peroxyacid bleaching system

A preferred feature of the component of the invention or the cleaning compositions containing the foaming component of the invention, is an organic peroxyacid bleaching system. In one preferred execution the bleaching system contains a

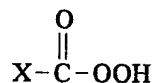
hydrogen peroxide source and an organic peroxyacid bleach precursor compound. The production of the organic peroxyacid occurs by an in situ reaction of the precursor with a source of hydrogen peroxide. Preferred sources of hydrogen peroxide include inorganic perhydrate bleaches, such as the perborate bleach of the claimed invention. In an alternative preferred execution a preformed organic peroxyacid is incorporated directly into the composition. Compositions containing mixtures of a hydrogen peroxide source and organic peroxyacid precursor in combination with a preformed organic peroxyacid are also envisaged.

#### Peroxyacid bleach precursor

Peroxyacid bleach precursors are compounds which react with hydrogen peroxide in a perhydrolysis reaction to produce a peroxyacid. Generally peroxyacid bleach precursors may be represented as



where L is a leaving group and X is essentially any functionality, such that on perhydrolysis the structure of the peroxyacid produced is



Peroxyacid bleach precursor compounds are preferably incorporated at a level of from 0.5% to 6% by weight, more preferably from 1% to 40 by weight, most preferably from 1.5% to 25 by weight of the compositions or component

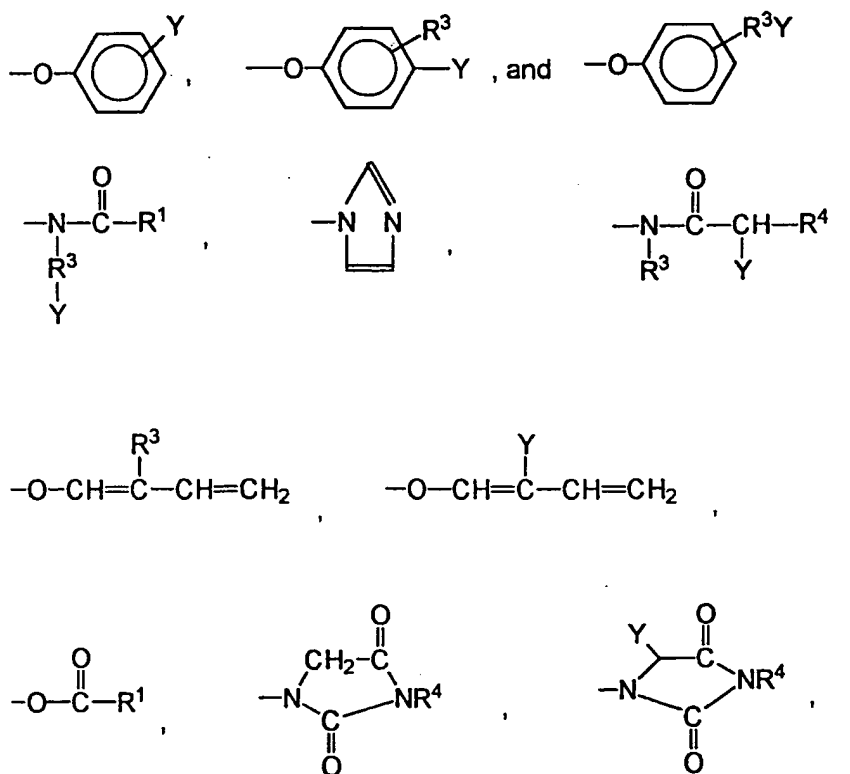
Suitable peroxyacid bleach precursor compounds typically contain one or more N- or O-acyl groups, which precursors can be selected from a wide range of classes. Suitable classes include anhydrides, esters, imides, lactams and acylated derivatives of

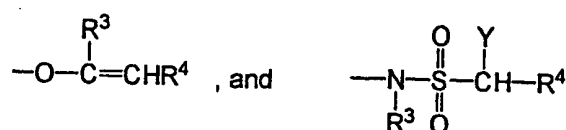
imidazoles and oximes. Examples of useful materials within these classes are disclosed in GB-A-1586789. Suitable esters are disclosed in GB-A-836988, 864798, 1147871, 2143231 and EP-A-0170386.

### Leaving groups

The leaving group, hereinafter L group, must be sufficiently reactive for the perhydrolysis reaction to occur within the optimum time frame (e.g., a wash cycle). However, if L is too reactive, this activator will be difficult to stabilize for use in a bleaching composition.

Preferred L groups are selected from the group consisting of:





and mixtures thereof, wherein  $R^1$  is an alkyl, aryl, or alkaryl group containing from 1 to 14 carbon atoms,  $R^3$  is an alkyl chain containing from 1 to 8 carbon atoms,  $R^4$  is H or  $R^3$ , and Y is H or a solubilizing group. Any of  $R^1$ ,  $R^3$  and  $R^4$  may be substituted by essentially any functional group including, for example alkyl, hydroxy, alkoxy, halogen, amine, nitrosyl, amide and ammonium or alkyl ammonium groups.

The preferred solubilizing groups are  $-\text{SO}_3^- \text{M}^+$ ,  $-\text{CO}_2^- \text{M}^+$ ,  $-\text{SO}_4^- \text{M}^+$ ,  $-\text{N}^+(\text{R}^3)_4 \text{X}^-$  and  $\text{O}=\text{N}(\text{R}^3)_3$  and most preferably  $-\text{SO}_3^- \text{M}^+$  and  $-\text{CO}_2^- \text{M}^+$  wherein  $R^3$  is an alkyl chain containing from 1 to 4 carbon atoms, M is a cation which provides solubility to the bleach activator and X is an anion which provides solubility to the bleach activator. Preferably, M is an alkali metal, ammonium or substituted ammonium cation, with sodium and potassium being most preferred, and X is a halide, hydroxide, methylsulfate or acetate anion.

#### Alkyl percarboxylic acid bleach precursors

Alkyl percarboxylic acid bleach precursors form percarboxylic acids on perhydrolysis. Preferred precursors of this type provide peracetic acid on perhydrolysis.

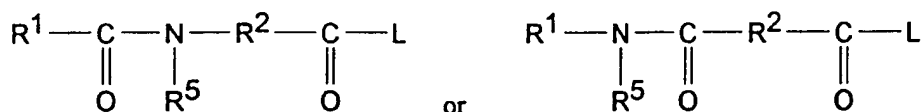
Preferred alkyl percarboxylic precursor compounds of the imide type include the N-,N,N',N' tetra acetylated alkylene diamines wherein the alkylene group contains from 1 to 6 carbon atoms, particularly those compounds in which the alkylene group contains 1, 2 and 6 carbon atoms. Tetraacetyl ethylene diamine (TAED) is particularly preferred. The TAED is preferably not present in the agglomerated particle of the present invention, but preferably present in the detergent composition, comprising the particle.



Other preferred alkyl percarboxylic acid precursors include sodium 3,5,5-tri-methyl hexanoyloxybenzene sulfonate (iso-NOBS), sodium nonanoyloxybenzene sulfonate (NOBS), sodium acetoxymethyl benzene sulfonate (ABS) and pentaacetyl glucose.

#### Amide substituted alkyl peroxyacid precursors

Amide substituted alkyl peroxyacid precursor compounds are suitable herein, including those of the following general formulae:



wherein  $\text{R}^1$  is an alkyl group with from 1 to 14 carbon atoms,  $\text{R}^2$  is an alkylene group containing from 1 to 14 carbon atoms, and  $\text{R}^5$  is H or an alkyl group containing 1 to 10 carbon atoms and L can be essentially any leaving group. Amide substituted bleach activator compounds of this type are described in EP-A-0170386.

#### Perbenzoic acid precursor

Perbenzoic acid precursor compounds provide perbenzoic acid on perhydrolysis. Suitable O-acylated perbenzoic acid precursor compounds include the substituted and unsubstituted benzoyl oxybenzene sulfonates, and the benzylation products of sorbitol, glucose, and all saccharides with benzoylating agents, and those of the imide type including N-benzoyl succinimide, tetrabenzoyl ethylene diamine and the N-benzoyl substituted ureas. Suitable imidazole type perbenzoic acid precursors include N-benzoyl imidazole and N-benzoyl benzimidazole. Other useful N-acyl group-containing perbenzoic acid precursors include N-benzoyl pyrrolidone, dibenzoyl taurine and benzoyl pyroglutamic acid.

Cationic peroxyacid precursors

Cationic peroxyacid precursor compounds produce cationic peroxyacids on perhydrolysis.

Typically, cationic peroxyacid precursors are formed by substituting the peroxyacid part of a suitable peroxyacid precursor compound with a positively charged functional group, such as an ammonium or alkyl ammonium group, preferably an ethyl or methyl ammonium group. Cationic peroxyacid precursors are typically present in the solid detergent compositions as a salt with a suitable anion, such as a halide ion.

The peroxyacid precursor compound to be so cationically substituted may be a perbenzoic acid, or substituted derivative thereof, precursor compound as described hereinbefore. Alternatively, the peroxyacid precursor compound may be an alkyl percarboxylic acid precursor compound or an amide substituted alkyl peroxyacid precursor as described hereinafter.

Cationic peroxyacid precursors are described in U.S. Patents 4,904,406; 4,751,015; 4,988,451; 4,397,757; 5,269,962; 5,127,852; 5,093,022; 5,106,528; U.K. 1,382,594; EP 475,512, 458,396 and 284,292; and in JP 87-318,332.

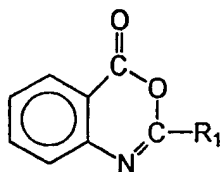
Examples of preferred cationic peroxyacid precursors are described in UK Patent Application No. 9407944.9 and US Patent Application Nos. 08/298903, 08/298650, 08/298904 and 08/298906.

Suitable cationic peroxyacid precursors include any of the ammonium or alkyl ammonium substituted alkyl or benzoyl oxybenzene sulfonates, N-acylated caprolactams, and monobenzoyltetraacetyl glucose benzoyl peroxides. Preferred cationic peroxyacid precursors of the N-acylated caprolactam class include the

trialkyl ammonium methylene benzoyl caprolactams and the trialkyl ammonium methylene alkyl caprolactams.

#### Benzoxazin organic peroxyacid precursors

Also suitable are precursor compounds of the benzoxazin-type, as disclosed for example in EP-A-332,294 and EP-A-482,807, particularly those having the formula:

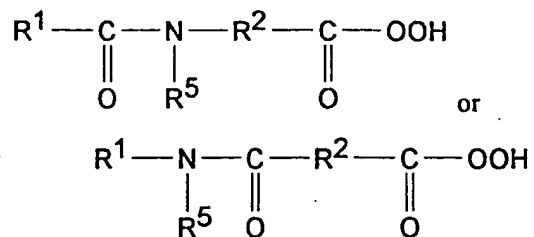


wherein  $R_1$  is H, alkyl, alkaryl, aryl, or arylalkyl.

#### Preformed organic peroxyacid

The organic peroxyacid bleaching system may contain, in addition to, or as an alternative to, an organic peroxyacid bleach precursor compound, a preformed organic peroxyacid, typically at a level of from 1% to 15% by weight, more preferably from 1% to 10% by weight of the composition.

A preferred class of organic peroxyacid compounds are the amide substituted compounds of the following general formulae:



wherein R<sup>1</sup> is an alkyl, aryl or alkaryl group with from 1 to 14 carbon atoms, R<sup>2</sup> is an alkylene, arylene, and alkarylene group containing from 1 to 14 carbon atoms, and R<sup>5</sup> is H or an alkyl, aryl, or alkaryl group containing 1 to 10 carbon atoms. Amide substituted organic peroxyacid compounds of this type are described in EP-A-0170386.

Other organic peroxyacids include diacyl and tetraacylperoxides, especially diperoxydodecanedioic acid, diperoxytetradecanedioic acid and diperoxyhexadecanedioic acid. Mono- and diperazelaic acid, mono- and diperbrassylic acid and N-phthaloylaminoperoxycaproic acid are also suitable herein.

#### Heavy metal ion sequestrant

The component of the invention or the cleaning compositions containing the component of the invention preferably contain as an optional component a heavy metal ion sequestrant. By heavy metal ion sequestrant it is meant herein components which act to sequester (chelate) heavy metal ions. These components may also have calcium and magnesium chelation capacity, but preferentially they show selectivity to binding heavy metal ions such as iron, manganese and copper.

Heavy metal ion sequestrants are generally present at a level of from 0.005% to 20%, preferably from 0.1% to 10%, more preferably from 0.25% to 7.5% and most preferably from 0.5% to 5% by weight of the compositions or component

Suitable heavy metal ion sequestrants for use herein include organic phosphonates, such as the amino alkylene poly (alkylene phosphonates), alkali metal ethane 1-hydroxy disphosphonates and nitrilo trimethylene phosphonates.

Preferred among the above species are diethylene triamine penta (methylene phosphonate), ethylene diamine tri (methylene phosphonate) hexamethylene diamine tetra (methylene phosphonate) and hydroxy-ethylene 1,1 diphosphonate.

Other suitable heavy metal ion sequestrant for use herein include nitrilotriacetic acid and polyaminocarboxylic acids such as ethylenediaminetetracetic acid, ethylenetriamine pentacetic acid, ethylenediamine disuccinic acid, ethylenediamine diglutamic acid, 2-hydroxypropylenediamine disuccinic acid or any salts thereof. Especially preferred is ethylenediamine-N,N'-disuccinic acid (EDDS) or the alkali metal, alkaline earth metal, ammonium, or substituted ammonium salts thereof, or mixtures thereof.

Other suitable heavy metal ion sequestrants for use herein are iminodiacetic acid derivatives such as 2-hydroxyethyl diacetic acid or glyceryl imino diacetic acid, described in EP-A-317,542 and EP-A-399,133. The iminodiacetic acid-N-2-hydroxypropyl sulfonic acid and aspartic acid N-carboxymethyl N-2-hydroxypropyl-3-sulfonic acid sequestrants described in EP-A-516,102 are also suitable herein. The  $\beta$ -alanine-N,N'-diacetic acid, aspartic acid-N,N'-diacetic acid, aspartic acid-N-monoacetic acid and iminodisuccinic acid sequestrants described in EP-A-509,382 are also suitable.

EP-A-476,257 describes suitable amino based sequestrants. EP-A-510,331 describes suitable sequestrants derived from collagen, keratin or casein. EP-A-528,859 describes a suitable alkyl iminodiacetic acid sequestrant. Dipicolinic acid and 2-phosphonobutane-1,2,4-tricarboxylic acid are also suitable. Glycinamide-N,N'-disuccinic acid (GADS), ethylenediamine-N,N'-diglutamic acid (EDDG) and 2-hydroxypropylenediamine-N,N'-disuccinic acid (HPDDS) are also suitable.

Enzyme

Another preferred ingredient useful in the component of the invention or the cleaning compositions containing the component of the invention is one or more additional enzymes.

Preferred additional enzymatic materials include the commercially available lipases, cutinases, amylases, neutral and alkaline proteases, esterases, cellulases, pectinases, lactases and peroxidases conventionally incorporated into detergent compositions. Suitable enzymes are discussed in US Patents 3,519,570 and 3,533,139.

Preferred commercially available protease enzymes include those sold under the tradenames Alcalase, Savinase, Primase, Durazym, and Esperase by Novo Industries A/S (Denmark), those sold under the tradename Maxatase, Maxacal and Maxapem by Gist-Brocades, those sold by Genencor International, and those sold under the tradename Opticlean and Optimase by Solvay Enzymes. Protease enzyme may be incorporated into the compositions in accordance with the invention at a level of from 0.0001% to 20% of active enzyme by weight of the composition or component

Preferred amylases include, for example,  $\alpha$ -amylases obtained from a special strain of *B licheniformis*, described in more detail in GB-1,269,839 (Novo). Preferred commercially available amylases include for example, those sold under the tradename Rapidase by Gist-Brocades, and those sold under the tradename Termamyl and BAN by Novo Industries A/S. Amylase enzyme may be incorporated into the composition in accordance with the invention at a level of from 0.0001% to 2% active enzyme by weight of the composition.

Lipolytic enzyme may be present at levels of active lipolytic enzyme of from 0.0001% to 12% by weight, preferably 0.001% to 10% by weight of the component, and most preferably from 0.001% to 03% by weight of the compositions.

The lipase may be fungal or bacterial in origin being obtained, for example, from a lipase producing strain of Humicola sp., Thermomyces sp. or Pseudomonas sp. including Pseudomonas pseudoalcaligenes or Pseudomonas fluorescens. Lipase from chemically or genetically modified mutants of these strains are also useful herein. A preferred lipase is derived from Pseudomonas pseudoalcaligenes, which is described in Granted European Patent, EP-B-0218272.

Another preferred lipase herein is obtained by cloning the gene from Humicola lanuginosa and expressing the gene in Aspergillus oryza, as host, as described in European Patent Application, EP-A-0258 068, which is commercially available from Novo Industri A/S, Bagsvaerd, Denmark, under the trade name Lipolase. This lipase is also described in U.S. Patent 4,810,414, Høge-Jensen et al, issued March 7, 1989.

#### Organic polymeric compound

Organic polymeric compounds are preferred additional components of the foaming component of the invention or the cleaning compositions containing the component of the invention, and are preferably present as components of any particulate components where they may act such as to bind the particulate component together. By organic polymeric compound it is meant herein essentially any polymeric organic compound commonly used as dispersants, and anti-redeposition and soil suspension agents in detergent compositions, including any of the high molecular weight organic polymeric compounds described as clay flocculating agents herein.

Organic polymeric compound is typically incorporated in the detergent compositions of the invention at a level of from 0.1% to 60%, preferably from 0.5% to 25%, most preferably from 1% to 15% by weight of the compositions or component.

Examples of organic polymeric compounds include the water soluble organic homo- or co-polymeric polycarboxylic acids or their salts in which the polycarboxylic acid comprises at least two carboxyl radicals separated from each other by not more than

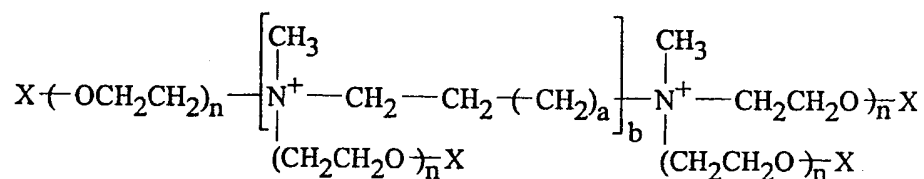
two carbon atoms. Polymers of the latter type are disclosed in GB-A-1,596,756. Examples of such salts are polyacrylates of MWt 2000-5000 and their copolymers with maleic anhydride, such copolymers having a molecular weight of from 20,000 to 100,000, especially 40,000 to 80,000.

The polyamino compounds are useful herein including those derived from aspartic acid such as those disclosed in EP-A-305282, EP-A-305283 and EP-A-351629.

Terpolymers containing monomer units selected from maleic acid, acrylic acid, polyaspartic acid and vinyl alcohol, particularly those having an average molecular weight of from 5,000 to 10,000, are also suitable herein.

Other organic polymeric compounds suitable for incorporation in the detergent compositions herein include cellulose derivatives such as methylcellulose, carboxymethylcellulose, hydroxypropylmethylcellulose and hydroxyethylcellulose.

Another organic compound, which is a preferred clay dispersant/ anti-redeposition agent, for use herein, can be the ethoxylated cationic monoamines and diamines of the formula:



wherein X is a nonionic group selected from the group consisting of H, C<sub>1</sub>-C<sub>4</sub> alkyl or hydroxyalkyl ester or ether groups, and mixtures thereof, a is from 0 to 20, preferably from 0 to 4 (e.g. ethylene, propylene, hexamethylene) b is 1 or 0; for cationic monoamines (b=0), n is at least 16, with a typical range of from 20 to 35; for cationic diamines (b=1), n is at least about 12 with a typical range of from about 12 to about 42.



Other dispersants/ anti-redeposition agents for use herein are described in EP-B-011965 and US 4,659,802 and US 4,664,848.

#### Clay softening system

The foaming component or the cleaning compositions may contain a clay softening system comprising a clay mineral compound and optionally a clay flocculating agent.

The clay mineral compound is preferably a smectite clay compound. Smectite clays are disclosed in the US Patents No.s 3,862,058, 3,948,790, 3,954,632 and 4,062,647. European Patents No.s EP-A-299,575 and EP-A-313,146 in the name of the Procter and Gamble Company describe suitable organic polymeric clay flocculating agents.

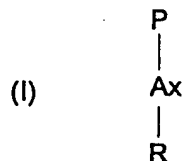
#### Polymeric dye transfer inhibiting agents

The foaming component or the cleaning compositions herein may also comprise from 0.01% to 10 %, preferably from 0.05% to 0.5% by weight of polymeric dye transfer inhibiting agents.

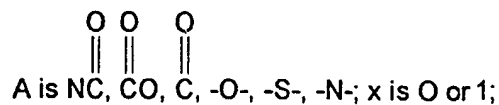
The polymeric dye transfer inhibiting agents are preferably selected from polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, polyvinylpyrrolidone polymers or combinations thereof.

##### a) Polyamine N-oxide polymers

Polyamine N-oxide polymers suitable for use herein contain units having the following structure formula :

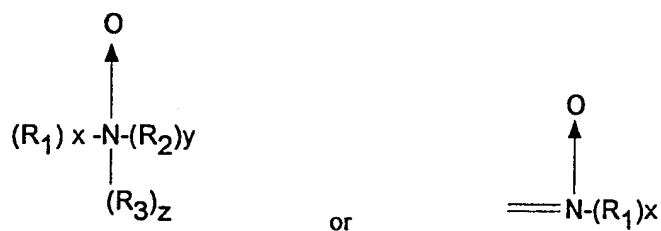


wherein P is a polymerisable unit, and



R are aliphatic, ethoxylated aliphatics, aromatic, heterocyclic or alicyclic groups or any combination thereof whereto the nitrogen of the N-O group can be attached or wherein the nitrogen of the N-O group is part of these groups.

The N-O group can be represented by the following general structures :



wherein R1, R2, and R3 are aliphatic groups, aromatic, heterocyclic or alicyclic groups or combinations thereof, x or/and y or/and z is 0 or 1 and wherein the nitrogen of the N-O group can be attached or wherein the nitrogen of the N-O group forms part of these groups. The N-O group can be part of the polymerisable unit (P) or can be attached to the polymeric backbone or a combination of both.

Suitable polyamine N-oxides wherein the N-O group forms part of the polymerisable unit comprise polyamine N-oxides wherein R is selected from aliphatic, aromatic,

alicyclic or heterocyclic groups. One class of said polyamine N-oxides comprises the group of polyamine N-oxides wherein the nitrogen of the N-O group forms part of the R-group. Preferred polyamine N-oxides are those wherein R is a heterocyclic group such as pyridine, pyrrole, imidazole, pyrrolidine, piperidine, quinoline, acridine and derivatives thereof.

Other suitable polyamine N-oxides are the polyamine oxides where to the N-O group is attached to the polymerisable unit. A preferred class of these polyamine N-oxides comprises the polyamine N-oxides having the general formula (I) wherein R is an aromatic, heterocyclic or alicyclic groups wherein the nitrogen of the N-O functional group is part of said R group. Examples of these classes are polyamine oxides wherein R is a heterocyclic compound such as pyridine, pyrrole, imidazole and derivatives thereof.

The polyamine N-oxides can be obtained in almost any degree of polymerisation. The degree of polymerisation is not critical provided the material has the desired water-solubility and dye-suspending power. Typically, the average molecular weight is within the range of 500 to 1000,000.

#### b) Copolymers of N-vinylpyrrolidone and N-vinylimidazole

Suitable herein are copolymers of N-vinylimidazole and N-vinylpyrrolidone having an average molecular weight range of from 5,000 to 50,000. The preferred copolymers have a molar ratio of N-vinylimidazole to N-vinylpyrrolidone from 1 to 0.2.

#### c) Polyvinylpyrrolidone

The components or the compositions herein may also utilize polyvinylpyrrolidone ("PVP") having an average molecular weight of from 2,500 to 400,000. Suitable polyvinylpyrrolidones are commercially available from ISP Corporation, New York, NY and Montreal, Canada under the product names PVP K-15 (viscosity molecular

weight of 10,000), PVP K-30 (average molecular weight of 40,000), PVP K-60 (average molecular weight of 160,000), and PVP K-90 (average molecular weight of 360,000). PVP K-15 is also available from ISP Corporation. Other suitable polyvinylpyrrolidones which are commercially available from BASF Cooperation include Sokalan HP 165 and Sokalan HP 12.

d) Polyvinylloxazolidone

The compositions herein may also utilize polyvinylloxazolidones as polymeric dye transfer inhibiting agents. Said polyvinylloxazolidones have an average molecular weight of from 2,500 to 400,000.

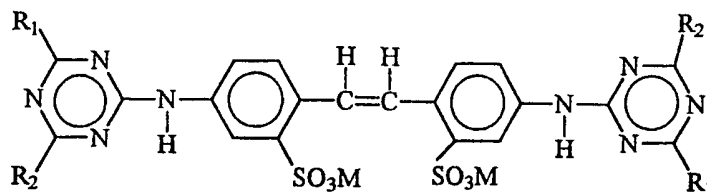
e) Polyvinylimidazole

The compositions herein may also utilize polyvinylimidazole as polymeric dye transfer inhibiting agent. Said polyvinylimidazoles preferably have an average molecular weight of from 2,500 to 400,000.

Optical brightener

The foaming component or cleaning compositions herein also optionally contain from about 0.005% to 5% by weight of certain types of hydrophilic optical brighteners.

Hydrophilic optical brighteners useful herein include those having the structural formula:



wherein  $R_1$  is selected from anilino, N-2-bis-hydroxyethyl and NH-2-hydroxyethyl;  $R_2$  is selected from N-2-bis-hydroxyethyl, N-2-hydroxyethyl-N-methylamino, morphilino, chloro and amino; and M is a salt-forming cation such as sodium or potassium.

When in the above formula,  $R_1$  is anilino,  $R_2$  is N-2-bis-hydroxyethyl and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-(N-2-bis-hydroxyethyl)-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid and disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal-UNPA-GX by Ciba-Geigy Corporation. Tinopal-UNPA-GX is the preferred hydrophilic optical brightener useful in the detergent compositions herein.

When in the above formula,  $R_1$  is anilino,  $R_2$  is N-2-hydroxyethyl-N-2-methylamino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-(N-2-hydroxyethyl-N-methylamino)-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid disodium salt. This particular brightener species is commercially marketed under the tradename Tinopal 5BM-GX by Ciba-Geigy Corporation.

When in the above formula,  $R_1$  is anilino,  $R_2$  is morphilino and M is a cation such as sodium, the brightener is 4,4'-bis[(4-anilino-6-morphilino-s-triazine-2-yl)amino]-2,2'-stilbenedisulfonic acid, sodium salt. This particular brightener species is commercially marketed under the tradename Tinopal AMS-GX by Ciba Geigy Corporation.

#### Cationic fabric softening agents

Cationic fabric softening agents can also be incorporated into the component of the invention or in compositions containing the component in accordance with the present invention. Suitable cationic fabric softening agents include the water insoluble

tertiary amines or dilong chain amide materials as disclosed in GB-A-1 514 276 and EP-B-0 011 340.

Cationic fabric softening agents are typically incorporated at total levels of from 0.5% to 15% by weight, normally from 1% to 5% by weight.

#### Other optional ingredients

Other optional ingredients suitable for inclusion in the compoennt of the invention or the cleaning compositions herein of include highly preferably perfumes, bleach catalysts, colours and filler salts, with sodium sulfate being a preferred filler salt.

#### pH of the compositions

The present foaming component or the cleaning compositions can have an acidic, neutral or an alkaline pH, depending on the application or the additional ingredients comprised in the component or composition. Preferably, the component or the compositions herein have a pH measured as a 1% solution in distilled water, of from 3 to 13.5, preferably least 4.0, preferably from to 12.5, most preferably from 5 to 12.0.

#### Form of the cleaning compositions

The cleaning compositions, comprising the component, can be made via a variety of methods, including dry-mixing, extruding, compressing and agglomerating of the various components comprised in the detergent composition. The foaming component of the invention can be present in the cleaning compositions as a separate component of the composition, or can be part of or added to other components or compounds of the compositions.

The cleaning compositions can take a variety of physical forms including granular, extrudates tablet or bar forms. The cleaning compositions are particularly the so-called concentrated granular detergent compositions adapted to be added to a washing machine by means of a dispensing drawer or by means of a dispensing device placed in the machine drum with the soiled fabric load.

The mean particle size of the base composition of granular cleaning compositions containing the foaming composition in accordance with the invention can be from 0.1 mm to 5.0 mm, but it should preferably be such that no more than 5% of particles are greater than 2.5mm in diameter, or even 1.7mm and that not more than 5% of particles are less than 0.15mm in diameter.

The term mean particle size as defined herein is calculated by sieving a sample of the composition into a number of fractions (typically 5 fractions) on a series of Tyler sieves. The weight fractions thereby obtained are plotted against the aperture size of the sieves. The mean particle size is taken to be the aperture size through which 50% by weight of the sample would pass.

The bulk density of granular cleaning or detergent compositions containing the particulate composition in accordance with the present invention typically have a bulk density of at least 300 g/litre, more preferably from 500 g/litre or even 650g/litre to 1200 g/litre, more preferably to 850 g/litre. Bulk density is measured by means of a simple funnel and cup device consisting of a conical funnel moulded rigidly on a base and provided with a flap valve at its lower extremity to allow the contents of the funnel to be emptied into an axially aligned cylindrical cup disposed below the funnel. The funnel is 130 mm high and has internal diameters of 130 mm and 40 mm at its respective upper and lower extremities. It is mounted so that the lower extremity is 140 mm above the upper surface of the base. The cup has an overall height of 90 mm, an internal height of 87 mm and an internal diameter of 84 mm. Its nominal volume is 500 ml.

To carry out a measurement, the funnel is filled with powder by hand pouring, the flap valve is opened and powder allowed to overfill the cup. The filled cup is removed from the frame and excess powder removed from the cup by passing a straight edged implement eg; a knife, across its upper edge. The filled cup is then weighed and the value obtained for the weight of powder doubled to provide a bulk density in g/litre. Replicate measurements are made as required.

The composition is preferably soluble in cold or cool water, i.e. the composition readily dissolves/disperses in water at a temperature between about 0°C and 32.2°C, preferably between about 1.6°C and 10°C.

#### Laundry washing method

Machine laundry methods herein typically comprise treating soiled laundry with an aqueous wash solution in a washing machine having dissolved or dispensed therein an effective amount of a machine laundry components of the invention or composition comprising the foaming component of the invention. By an effective amount of the detergent composition it is meant from 40g to 300g of product dissolved or dispersed in a wash solution of volume from 5 to 65 litres, as are typical product dosages and wash solution volumes commonly employed in conventional machine laundry methods.

#### Abbreviations used in Examples

In the exemplified foaming component and cleaning compositions, the abbreviated component identifications have the following meanings:

LAS	:	Sodium linear C <sub>12</sub> alkyl benzene sulfonate
TAS	:	Sodium tallow alkyl sulfate
C45AS	:	Sodium C <sub>14</sub> -C <sub>15</sub> linear alkyl sulfate



MES	:	$\alpha$ -sulpho methylester of $C_{18}$ fatty acid
$C_{xy}EzS$	:	Sodium $C_{1x}-C_{1y}$ branched alkyl sulfate condensed with z moles of ethylene oxide
$MBAS_{x,y}$	:	Sodium mid-chain branched alkyl sulfate having an average of x carbon atoms, whereof an average of y carbons comprised in (a) branching unit(s)
$C_{48}SAS$	:	Sodium $C_{14}-C_{18}$ secondary alcohol sulfate
$SADEXS$	:	Sodium $C_{14}-C_{22}$ alkyl disulfate of formula $2-(R).C_4H_7-1,4-(SO_4)_2$ where $R = C_{10}OC_{18}$ , condensed with z moles of ethylene oxide
$C_{xy}Ez$	:	A $C_{1x}-1y$ branched primary alcohol condensed with an average of z moles of ethylene oxide
QAS I	:	$R_2.N^+(CH_3)_2(C_2H_4OH)$ with $R_2 = 50\%-60\% C_9$ ; 40%-50% $C_{11}$
QAS II	:	$R_1.N^+(CH_3)(C_2H_4OH)_2$ with $R_1 = C_{12}-C_{14}$
Soap	:	Sodium linear alkyl carboxylate derived from an 80/20 mixture of tallow and coconut oils.
TFAA I	:	$C_{12}-C_{14}$ alkyl N-methyl glucamide
TFAA II	:	$C_{16}-C_{18}$ alkyl N-methyl glucamide
TPKFA	:	$C_{12}-C_{14}$ topped whole cut fatty acids
STPP	:	Anhydrous sodium tripolyphosphate
Zeolite A I	:	Hydrated Sodium Aluminosilicate of formula $Na_{12}(Al_{10}Si_{12}O_{52}) \cdot 27H_2O$ having a primary particle size in the range from 0.1 to 10 micrometers
Zeolite A II	:	overdried Zeolite A I
NaSKS-6	:	Crystalline layered silicate of formula $\delta-Na_2Si_2O_5$
Citric acid I	:	Anhydrous citric acid
Citric acid II	:	Citric acid monohydrate
Malic acid	:	Anhydrous malic acid
Maleic acid	:	Anhydrous maleic acid
Aspartic acid	:	Anhydrous aspartic acid

Carbonate I	:	Anhydrous sodium carbonate with an average particle size between 200µm and 900µm
Carbonate II	:	Anhydrous sodium carbonate with an average particle size between 100µm and 200µm
Bicarbonate	:	Anhydrous sodium bicarbonate with a particle size distribution between 400µm and 1200µm
Silicate	:	Amorphous Sodium Silicate (SiO <sub>2</sub> :Na <sub>2</sub> O; 2.0 ratio)
Sodium sulfate	:	Anhydrous sodium sulfate
Citrate	:	Tri-sodium citrate dihydrate of activity 86.4% with a particle size distribution between 425µm and 850µm
MA/AA	:	Copolymer of 1:4 maleic/acrylic acid, average molecular weight about 70,000
CMC	:	Sodium carboxymethyl cellulose
Protease	:	Proteolytic enzyme of activity 4KNPU/g sold by NOVO Industries A/S under the tradename Savinase
Alcalase	:	Proteolytic enzyme of activity 3AU/g sold by NOVO Industries A/S
Cellulase	:	Cellulytic enzyme of activity 1000 CEVU/g sold by NOVO Industries A/S under the tradename Carezyme
Amylase	:	Amylolytic enzyme of activity 60KNU/g sold by NOVO Industries A/S under the tradename Termamyl 60T
Lipase	:	Lipolytic enzyme of activity 100kLU/g sold by NOVO Industries A/S under the tradename Lipolase
Endolase	:	Endoglunase enzyme of activity 3000 CEVU/g sold by NOVO Industries A/S
PB4	:	Sodium perborate tetrahydrate of nominal formula NaBO <sub>2</sub> .3H <sub>2</sub> O.H <sub>2</sub> O <sub>2</sub>
PB1	:	Anhydrous sodium perborate bleach of nominal formula NaBO <sub>2</sub> .H <sub>2</sub> O <sub>2</sub>

Percarbonate	:	Sodium Percarbonate of nominal formula $2\text{Na}_2\text{CO}_3 \cdot 3\text{H}_2\text{O}_2$
NAC-OBS	:	(Nonanamido caproyl) oxybenzene sulfonate in the form of the sodium salt.
NOBS	:	Nonanoyl oxybenzene sulfonate in the form of the sodium salt
DPDA	:	Diperoxydodecanedioic acid
PAP	:	N-phthaloylamidoperoxicaproic acid
NAPAA	:	Nonanoylamido peroxo-adipic acid
NACA	:	6 nonylamino - 6 oxo - capronic acid.
TAED	:	Tetraacetythylenediamine
DTPMP	:	Diethylene triamine penta (methylene phosphonate), marketed by Monsanto under the Trade name Dequest 2060
Photoactivated	:	Sulfonated Zinc or aluminium Phthlocyanine encapsulated
Brightener 1	:	Disodium 4,4'-bis(2-sulphostyryl)biphenyl
Brightener 2	:	Disodium 4,4'-bis(4-anilino-6-morpholino-1.3.5-triazin- 2-yl)amino) stilbene-2:2'-disulfonate.
HEDP	:	1,1-hydroxyethane diphosphonic acid
PVNO	:	Polyvinylpyridine N-oxide
PVPVI	:	Copolymer of polyvinylpyrrolidone and vinylimidazole
QEA	:	bis $((\text{C}_2\text{H}_5\text{O})(\text{C}_2\text{H}_4\text{O})_n) (\text{CH}_3) - \text{N}^+ - \text{C}_6\text{H}_{12} - \text{N}^+ -$ $(\text{CH}_3)$ bis $((\text{C}_2\text{H}_5\text{O})-(\text{C}_2\text{H}_4\text{O})_n)$ , wherein n=from 20 to 30
SRP 1	:	Sulfobenzoyl end capped esters with oxyethylene oxy and terephthaloyl backbone
SRP 2	:	Diethoxylated poly (1, 2 propylene terephthalate) short block polymer

**Silicone antifoam** : Polydimethylsiloxane foam controller with siloxane-oxyalkylene copolymer as dispersing agent with a ratio of said foam controller to said dispersing agent of 10:1 to 100:1.

In the following Examples all levels are quoted as parts per weight of the composition or % by weight of the composition, as indicated:

### Particulate Foaming Component Examples

The following examples exemplify particulate foaming components in accord with the invention, each of which, or mixtures thereof, can be used in cleaning compositions.

The particulate components of the invention can be made by any method known in the art for formation of particles, as described above. The following particulate components are formed by formation of a melt of the substantially anhydrous stabilising agent, and addition of the melt to a premix of the other component to the melt, mixing the ingredients thoroughly, whereafter the melt is solidified.

### Particles A to J

[illegible]

sodium carbonate I	13.5	-	20.0	-	-	-	-	-	15.0	10.0
sodium carbonate II	-	14.0	-	6.0	14.0	20.0	10.0	10.0	5.0	-
sodium bicarbonate	-	-	-	6.0	-	-	10.0	-	5.5	5.0
Zeolite A II	18.0	35.7	20.0	18.0	-	9.0	10.0	5.0	14.0	17.0
LAS	9.0	-	-	-	12.0	-	-	10.0	-	13.0
QAS I/ QAS II	9.0	-	-	-	-	-	6.0	3.0	-	-
TAED/ NOBS/ NACA-OBS	-	-	-	19.0	10.0	-	-	7.0	35.0	-
Perborate/ percarbonate	-	-	-	-	-	19.0	-	20.0	-	-
Silicone antifoam	-	-	-	-	8.0	-	-	-	-	5.0

The following examples exemplify cleaning compositions comprising the foaming component of the invention:

#### **Example I**

The following are high density and bleach-containing detergent formulations according to the present invention:

	a	b	c
Blown Powder			
Zeolite A	5.0	5.0	15.0

Sodium sulfate	0.0	5.0	0.0
LAS	-	5.0	3.0
C45AS	3.0	2.0	4.0
QAS	-	-	1.5
DTPMP	0.4	0.4	0.4
CMC	0.4	0.4	0.4
MA/AA	4.0	2.0	2.0
Particle A	20.0		
Particle B	-	15.0	-
Particle E	-	-	10.0
Spray On (on particles)			
Encapsulated Perfume	0.3	0.3	0.3
C25E3	-	-	2.0
Dry additives			
QEA	-	-	0.5
Citrate	5.0	-	2.0
Bicarbonate	-	3.0	-
Carbonate	8.0	10.0	5.0
NAC OBS	6.0	-	-
Manganese catalyst	-	-	0.3
NOBS	-	2.0	-
PB1	14.0	7.0	-
Polyethylene oxide of MW 5,000,000	-	-	0.2
Bentonite clay	-	-	10.0
Citric acid	-	-	0.5
Protease	1.0	1.0	1.0
Lipase	0.4	0.4	0.4
Amylase	0.6	0.6	0.6
Cellulase	0.6	0.6	0.6
Silicone antifoam	5.0	5.0	5.0

Dry additives			
Sodium sulfate	0.0	3.0	0.0
Balance (Moisture and Miscellaneous)	100.0	100.0	100.0
Density (g/litre)	850	850	850

**Example 2**

The following are high density detergent formulations according to the present invention:

	d	e
Particle A	15.0	
Particle H		30.0
Spray On		
C25E3	-	1.0
Perfume	0.5	0.5
Dry Adds		
HEDP	0.5	0.3
SKS 6	13.0	10.0
Citrate	-	1.0
NAC OBS	4.1	-
TAED	0.8	-
Percarbonate	20.0	5.0
SRP 1	0.3	0.3
Protease	1.4	1.4
Lipase	0.4	0.4
Cellulase	0.6	0.6
Amylase	0.6	0.6

QEA	1.0	-
Silicone antifoam	5.0	5.0
Brightener 1	0.2	0.2
Brightener 2	0.2	-
Density (g/litre)	850	850



What is claimed is:

1. A substantially anhydrous foaming component, capable of providing foaming or sudsing without agitation, comprising intimately mixed, a substantially anhydrous surface active component capable of reducing the air-water surface tension, and an effervescence component capable of formation of a gas upon contact with water.
2. A foaming component according to claim 1, producing upon contact with water gas bubbles having an average bubble particle size of 400 microns or less, preferably 200 microns or less, more preferably 100 microns or less.
3. A component according to claim 1 or 2, obtainable by a process comprising the steps of
  - a) formation of a melt of the surface active component;
  - b) addition of the melt of step a) to the effervescence component to obtain an intimate mixture of the effervescence component and the surface active component and formation of the foaming component.
4. A component according to any preceding claim wherein the effervescence component comprises an organic acid source and a carbonate source, preferably being substantially anhydrous.
5. A component according to claim 1, 2 or 4, wherein the surface active component comprises one or more anionic surfactants, preferably alkyl sulfonates or alkyl sulfates or mixtures thereof.

6. A component according to any preceding claim, whereby the surface active component has a melting point above 45°C, preferably comprising a nonionic surface active compound selected from the group comprising nonionic alkoxyated amides, alkyl esters of fatty acids, or alkoxyated alcohols, preferably one or more nonionic surface active compounds, selected from the group consisting of polyhydroxy fatty acid amides and condensation products of aliphatic alcohols with from 1 to 15 moles of alkylene oxide.
7. A component according to any preceding claim comprising the surface active component at a level of from 10% to 70% and the effervescence component at a level of from 10% to 90% by weight.
8. A component according to any preceding claim comprising additionally one or more detergent actives, selected from the group comprising builders, perhydrate bleach, bleach activators, enzymes, chelants, suds suppressing systems, brighteners.
9. Use of a component according to any preceding claim in a cleaning composition for providing sudsing.
10. Use of a composition according to any of claims 1 to 8 for use in food or beverage product for providing foaming.
11. A method of providing without agitation, sudsing or foaming by contacting a component according to any of claims 1 to 8 with water.
12. A method for providing improved effervescence and dispensing or dissolving by contacting a component according to any of claims 1 to 8 with water.

13. A process for preparation of a component according to any of claims 1 to 7, comprising the steps of
- a) formation of a melt of the surface active component;
  - b) addition of the melt of step a) to the effervescence component to obtain an intimate mixture of the effervescence component and the surface active component and formation of the foaming component.
14. A process according to claim 13 which is part of an agglomeration or extrusion process.
15. A nonaqueous liquid or solid cleaning compositions, preferably in the form of granules or tablets, comprising the component according to any of claims 1 to 8, preferably in the form of a particle.
16. A method for washing fabrics whereby the fabrics are contacted with the component according to any of claims 1 to 8 or the composition according to claim 15, or solutions thereof.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 98/00560

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 6 C11D3/00 C11D17/06 C11D3/20 C11D3/10 C11D1/12 C11D1/66 C11D1/72 C11D1/825				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 6 C11D				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 4 252 664 A (INAMORATO JACK T) 24 February 1981  see column 1, line 28 - line 65 see claim 1	1-4, 6-9, 11-13, 15, 16		
X	WO 95 20030 A (UNILEVER NV ; UNILEVER PLC (GB)) 27 July 1995 see page 7, line 22 - line 29 see page 12, line 8 - page 13, line 14 see page 15, line 14 - line 26 see claims 1-36	1, 2, 4-9, 11, 15		
X	WO 96 02621 A (CROSFIELD JOSEPH & SONS ; OSINGA THEO JAN (NL)) 1 February 1996  see page 10, line 11 - line 36 see claims 1-22	1, 2, 4, 6, 8, 9, 11, 12, 15		
-/-				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.				
<input checked="" type="checkbox"/> Patent family members are listed in annex.				
<b>* Special categories of cited documents :</b>				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;">           "A" document defining the general state of the art which is not considered to be of particular relevance            "E" earlier document but published on or after the international filing date            "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)            "O" document referring to an oral disclosure, use, exhibition or other means            "P" document published prior to the international filing date but later than the priority date claimed         </td> <td style="width: 50%; vertical-align: top; padding: 5px;">           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention            "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone            "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.            "&amp;" document member of the same patent family         </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family			
Date of the actual completion of the international search  <div style="text-align: center;">21 August 1998</div>		Date of mailing of the international search report  <div style="text-align: center;">31/08/1998</div>		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  <div style="text-align: center;">Richards, M</div>		

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 98/00560

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 107 824 A (MAUVERNAY ROLAND Y) 27 March 1968 the whole document ---	1-15
A	US 4 919 918 A (COLE B HARRISON ET AL) 24 April 1990 see claim 1 -----	1-15

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